New Till Age

Growers spread the word that putting away the plow can actually improve efficiency on the farm and help conserve soil and water. By T.J. Burnham

Asking farmers to deep six their plows is only the beginning. Next, conservation tillage advocates will be ripping away the chisel and campaigning against nearly any disturbance of the soil.
With encouragement, these environmental exponents would slam the concept of making that 11th trip over the land just to fine comb the field into flawless cosmetic perfection.
Who are these guys? They're farmers.

Conservation tillage, while practiced on less than 1% of California's Currier and Ives picture-perfect land, is even coming to the Golden State . . . slowly. At least, that's what farmers and researchers from throughout the U.S. hoped as they told their success stories at special conferences this year in Five Points and Davis.

Spreading the word that the land does not need to be mercilessly carved to be productive, their message is that farmers can become more efficient while conserving soil and water if they sideline their earth-gouging equipment. While the practice is used in many areas of the Midwest, South and Pacific Northwest, only about .5% of California row crop farms use reduced tillage, says University of California-Davis vegetable crops specialist Jeff Mitchell.

Conservation tillage, which preserves below-ground soil health and maintains the surface cover, "provides dazzling, spectacular results," he says. "A lot of the goals of conservation tillage relate to California agriculture, but it has not caught on here like it has in other areas of the nation."
Getting the word out on conservation farming is a key concern of Boone, Iowa farmer, Dick Thompson who initiated an alternative tillage network through the Practical Farmers of Iowa research, demonstration effort. Catching the interest of California growers, Thompson talks about a $54 an acre savings he achieved on his farm using ridge tillage without herbicides.
"There is no tillage between last year's June cultivation and this year's May planting," he says of the corn/soybean fields. "As a result, weed seeds are not exposed to oxygen or light and do not germinate.

Cover Crops

As a means of reducing weed pressure as well as wind and water erosion, cover crops are planted in the fall at the farm, Thompson says. Winter annual weeds and surface weeds are allowed to grow in early spring, which he says inhibits later germinating weeds.
Using a Buffalo planter, he cleans off top-dressed livestock manure, weeds and weed seeds over the row, creating a low weed density planting zone. Using the planter, he says, leaves loose soil over the firmly planted corn seed. Loose soil, he notes, is not a good weed environment.
"We plant crops thicker [corn at six-inch spacing], and use a high-residue rotary hoe before and after emergence," he adds. A high-residue cultivator with hillers is used to remove weeds between rows. Post-emergence pesticides can be used, Thompson adds, "as a last resort if all cultural techniques fail." "Don't overdo cover crops," he warns. "Avoid planting a forest, because a little normally achieves the purposes you need."

All of Thompson's grain fertilization needs are met using beef, cow and hog manure.
Economic data reported by Thompson shows the farm has posted a $138 per acre increase in returns since 1988 for the manure-fertilized grain, compared with conventionally-farmed corn/soybean rotations. His alternative farming system return was a positive $110 per acre, compared with traditional systems which lost $27, he says. That early weed growth controls later weeds is "the best kept secret in agriculture," says his wife, Sharon. Early weeds send a message to what would be later weeds, "telling them not to grow," she adds.

Developing a conservation tillage system "will not work if you are not positive about making it work," says John Bradley, Monsanto Corp. specialist from Collierville, Tenn. Working with the Tennessee Agricultural Experiment Station, he is convinced "the technology is here now to devise a conservation tillage system for your farm that will be successful."

No-till crop production and residue management and/or cover crop production "is the best solution to soil erosion problems in West Tennessee," he says. "The fact farmers have accepted and adopted this concept makes no-till a true agricultural success."

Last year, nearly 50% of the corn, soybean, grain sorghum, wheat and cotton in his state was no-tilled, Bradley reports. In 1999, only 32% of Tennessee's total cropland was plowed, he adds, making it one of the lowest erosion states in the nation. Nearly 45 million of America's acres relied on soil conservation methods, he says.

Bradley lists 12 reasons to stop plowing, including reduced labor requirements, time savings, improved field accessibility and lower machinery investment and reduced operating costs. Additionally, soil erosion is reduced and water infiltration improved, he says, while increasing organic matter, decreasing compaction and improving tilth. Wildlife food habitat and air pollution reductions are also advantages, he says.

"Get involved, or you will be left behind," he says of the move to conservation tillage. "Once you start a project, don't give up. Fear of failure is the biggest reason farmers are reluctant to give this system a try.

"You can make it work. Don't procrastinate."
Corvallis, Ore., farm manager Rob Heater, Stahlbush Island Farms, Inc., says his vegetable operation saves at least $14 an acre in tillage costs using strip till, an unusual technique in the Willamette Valley.

The farmer is encouraged so much he will strip-till 90% of the Stahlbush acreage this year, taking note that in most years yields are the same or above those of conventionally treated land. "Looking at total costs, we have a 75% probability of an average $64 savings per acre increase, and only a 25% probability of a decrease of $38," he reports.

Cover crops can be a problem if they grow excessively in strip-tillage, he says, recommending plantings no taller than knee high. Make sure to handle compaction problems before switching to strip-till, he says.

"As a result of using these techniques, we have reduced chemical use by 50% since 1990," Heater says. "We're about 75% chemical-free in our corn, strawberries, squash and green beans, using only Roundup to burn down our cover crops." The farm uses flamer weeding units, which burn propane tanks on small units to control weeds. That operation costs about $3 an acre.
Holtwood, Pa., grower Steve Groff of Cedar Meadow Farm says he cut costs by $675 an acre growing no-till transplanted market tomatoes, about $500 of which is in material, labor and time savings. So convinced is he that his program can help others, he offers a $21.95 video, "No-Till Vegetables: A Sustainable Way to Increase Profits, Save Soil and Reduce Pesticides" through his Internet website (www.cedarmeadowfarm.com).

"I reduced my soil loss from an estimated six tons an acre a year to less than 500 using no-till and permanent cover, mulching and rotations," he says. Some of his acres have not been tilled for three decades, Groff notes. "These are some of our best fields today."

Using a 10-feet-wide rolling stalk chopper in his vetch and rye cover crops, he lays the tall vegetation on top of the ground and plants through the heavy residue.

Putting on only a quarter of the herbicides he applied before using no till, Groff has slashed overall pesticide costs from $200 to $75 an acre.

"I have not disturbed any of my fields at all for four years," he says. "Except for planting devices, these plantings have seen no steel during that time." In some fields, this has gone on for 30 years at Cedar Meadow Farms.

Networking with researchers and farmers trying conservation tillage is a fundamental "must-do" to success for newcomers, Groff says. "There is a lot of knowledge out there to benefit from, and you can avoid some mistakes and learn some very valuable ideas from these sources," he says.

California Experience

John Diener, one California grower who has adopted conservation tillage practices at his Red Rock Ranch near Five Points, practices non-tillage in his grape vines and almond orchard. "Our goal is building organic matter within the soil to achieve benefits of higher fertility," he says. "It works." Using an organic system on his row crops, he uses about one-third of the commercial fertilizers he applies to conventional land, substituting green manures and compost on some of these plantings. "Because of that, we have freed up a lot of tied up minerals," he says. "We are seeing substantial benefits in terms of reduced economic out-go."

Winters producer Bruce Rominger has expanded his organic acreage as a "necessary change to continually look at new technology," he says. "If we think we can make a living in farming doing things the way our Dad did, we are wrong."

For 15 years, he has worked out new tillage practices for his hillside dryland grain experimenting with no-till drills until opting to put the land under government set-aside. In the last two years, he

has no-tilled corn flat land planted to wheat with startling results following 2000's early season lack of rain.

"With the little bit of rain we had, this field was the best looking one we had," says Rominger, comparing the planting with conventionally farmed plantings. "We're very happy with the results." Flailing cotton stalks and planting no-till safflower also produced encouraging results, he says of a trial last spring. Responding to a need to irrigate to soften the soil, water penetration was so effective that even the moisture-sensitive safflower did not suffer, he reports. He has since planted wheat into the stubble of the safflower, making this his third no-till crop on the heavy clay.
One lesson he learned is to add a chaff spreader to the grain harvester on the no-till fields. "It is something we definitely will add this year," Rominger says.

"We are very optimistic and we will continue farming this way," he says. "I want to take care of the land for our children. We have to leave it productive for future generations."

Why should you care about conservation tillage? It could pay off in more than improved soil and greater productivity, according to Agricultural Research Service soil scientist Donald Reicosky, Morris, Minn. "You could make money off the carbon you save by keeping it in the ground," he believes.

While no government carbon storage payment programs are in place, he and others are actively lobbying Washington, D.C., agencies to develop organic matter credits. "We haven't found a lot of interest among those who would launch such programs, but I feel that some day carbon in the soil will actually mean real money in the bank," he says.

Farmers can "break new ground by breaking less soil," he says.

Working the soil releases invisible carbon into the atmosphere, robbing the land of organic material that is a keystone in soil health, Reicosky says. In that way, preserving carbon would be similar to conserving soil and water.

Overworking soil with metal tools is like an "iron toxicity" to farmland, he believes.
Soils filled with a "cocktail of critters" like beneficial microbes, fungi and worms, face the equivalent to an earthquake to human cities when the "turmoil of tillage" strikes, he adds. "Our soils are our fortunes, and the fortune is in carbon," Reicosky says.

Farming to sequester carbon can produce big results. Moldboard plowing in USDA tests lost five times more carbon than did no-till plots, he reports. "In our trials, we lost more carbon using the moldboard than the previous wheat crop put into the soil," he notes. "This explains the long-term losses in the Midwest where we have lost between 30% to 50% of the carbon due to intensive tillage."

The cumulative loss of carbon appears to be directly related to the volume of soil disturbed, adding credibility to claims that low and strip tillage units do a better conservation job than the moldboard. "If your goal is to minimize carbon dioxide loss, then you must minimize soil disturbance," he advises.

Since farmers need a seedbed, using some form of strip tillage may be the best choice, he says, while avoiding what could be a 5% yield loss through total no-till. "We have three years of data at USDA which show strip tillage is as good as conventional tillage in Minnesota. Strip-tillage may be the intermediate step we need to transist to no till until we can make no till competitive with conventional yields."

Once farmers realize that carbon is a key component in their soil health, "they will make decisions more often to preserve this important ingredient," Reicosky believes. Increasing carbon storage can increase infiltration and fertility, decrease wind and water erosion, minimize compaction, enhance water quality, impede pesticide movement and enhance environmental quality, he says.

While California farmers are not swarming to conservation tillage techniques, "this may be something that will become more popular once successful systems are developed under California's conditions," Mitchell says.

Preplant tillage operations typically account for a large part of production costs for many annual crops in the state. An average of nine to 11 tillage-related passes are routine during the fall-spring period to prepare the soil for summer cropping.

"These passes represent considerable energy, equipment and labor costs," he says, "but recent research indicates that tillage also reduces soil organic matter, which is widely considered to be an important component of healthy soil."

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